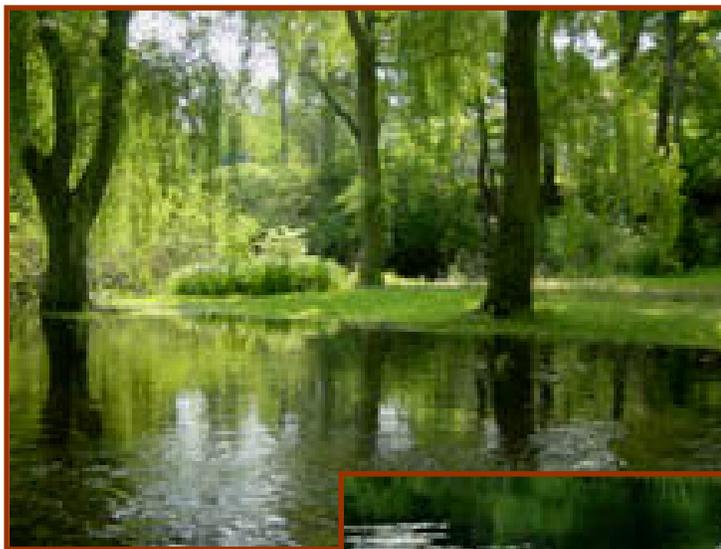


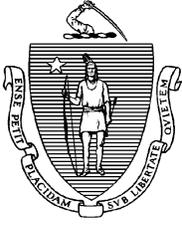
Executive Office of Environmental Affairs

SHAWSHEEN RIVER

5-Year Watershed Action Plan

2003-2008





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July 11, 2003

Dear Friends of the Shawsheen River Watershed:

It is with great pleasure that I present you with the 5-Year Watershed Action Plan for the Shawsheen River Watershed. The plan will be used to guide local and state environmental efforts within the Shawsheen River Watershed over the next five years, as well as implement the goals of the Executive Office of Environmental Affairs. These goals include improving water quality; restoring natural flows to rivers; protecting and restoring biodiversity and habitats; improving public access and balanced resource use; improving local capacity; and promoting a shared responsibility for watershed protection and management.

The Shawsheen River Watershed Action Plan was developed with input from state and federal agencies, Regional Planning Agencies, watershed groups, former watershed team members, local municipalities, and with extensive public involvement throughout the reaches of the watershed. This unique approach helps us focus on the problems and challenges that are identified with stakeholders and community partners in each watershed, rather than being decided solely at the state level. The priority issues and action strategies identified in the plan are to:

- Improve Water Quality
- Manage Flows
- Restore Wetlands and Healthy Habitats
- Promote Recreation Access/Use and Open Space, and
- Promote Outreach and Education on Resources in the Watershed

I commend everyone that was involved in this endeavor. Thank you for your dedication, perseverance, and commitment. If you are not currently a participant, I strongly encourage you to become active in the Shawsheen River Watershed restoration and protection efforts.

Regards,

A handwritten signature in cursive script that reads "Ellen Roy Herzfelder".

Ellen Roy Herzfelder

TABLE OF CONTENTS

CHAPTER 1 - INTRODUCTION.....	2
Priority Issues and Activities	2
The Former Shawsheen River Watershed Team	4
Watershed Associations	6
CHAPTER 2 – GOALS AND OBJECTIVES.....	7
CHAPTER 3 – ACTION PROJECTS	20
APPENDIX 1- STEERING COMMITTEE MEMBERS.....	30

LIST OF FIGURES

Figure 1	Shawsheen River Sub-basins.....	1
Figure 2	Content Brook Subwatershed.....	2
Figure 3	Fosters Pond Subwatershed.....	2
Figure 4	Elm Brook Subwatershed.....	3
Figure 5	Heath Brook Subwatershed.....	3
Figure 6	Spring Brook Subwatershed.....	4
Figure 7	Lower Shawsheen River Subwatershed.....	5
Figure 8	Middle Shawsheen River Subwatershed.....	5
Figure 9	Upper Shawsheen River Subwatershed.....	5
Figure 10	Vine Brook Subwatershed.....	5
Figure 11	Strong Water Brook Subwatershed.....	6

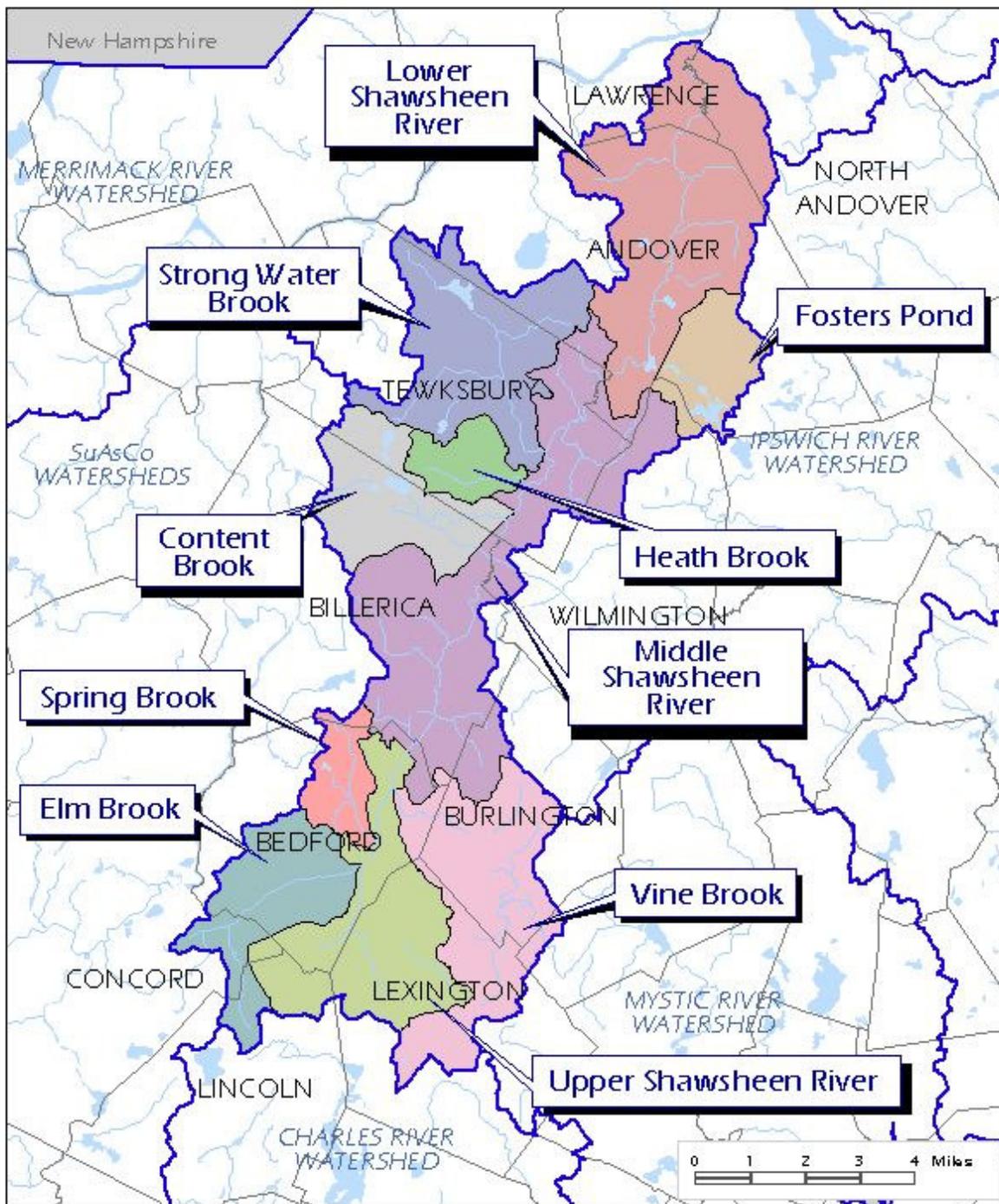


Figure 1: Shawsheen River Sub-basins

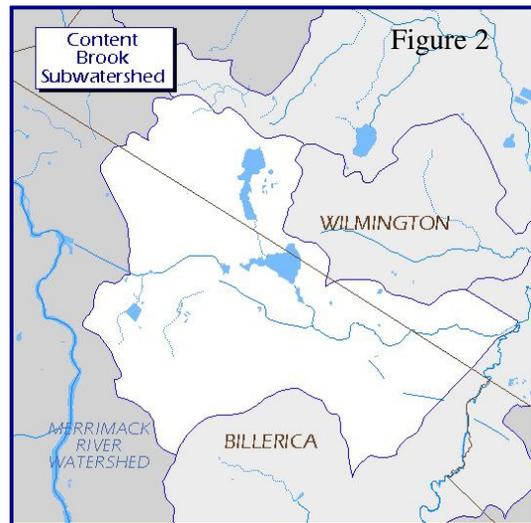
CHAPTER 1 - INTRODUCTION

The Shawsheen River Watershed is a part of the 27 river basins that make up the Commonwealth. The Shawsheen River, a tributary to the Merrimack River, is located in northeastern Massachusetts where it is bordered by the Merrimack, Ipswich, Charles, and Concord Rivers and Boston Harbor. The Shawsheen Watershed includes approximately 60 miles of named streams and encompasses a drainage area of 78 square miles. About 4.5% of the watershed is covered by wetlands or open waters. The main stem of the Shawsheen River flows 25 miles from the headwaters in Hanscom Field in Bedford to its confluence with the Merrimack River in Lawrence. The mainstem channel depth ranges between half and five feet. In Andover, the river is impounded by two dams, one at Ballardvale Village and the other at Stevens Street.

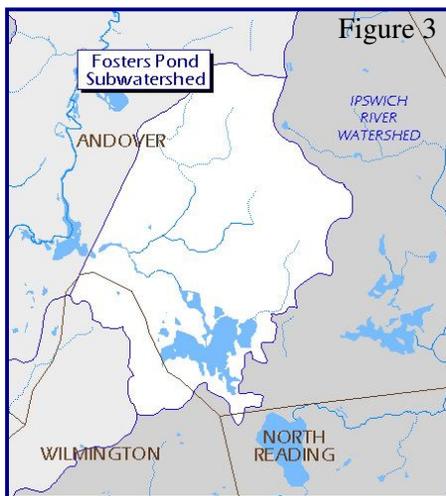
The watershed includes 20 lakes, ponds, or impoundments. Almost half of these water bodies are in Andover. Five are wholly or partly located in Tewksbury. The other lakes are located in Bedford, Billerica, Burlington, and Wilmington.

All or a portion of twelve cities and towns lie within the watershed. They are Andover, Bedford, Billerica, Burlington, Concord, Lawrence, Lexington, Lincoln, North Andover, Tewksbury, Wilmington, and Woburn. Portions of Andover, Lawrence, and Lexington are the most urban in character, but almost all of these municipalities are densely populated.

Like its predecessor, the Neponset (the first watershed team), the partnerships in the Shawsheen are very unique. Initially, the two most active entities in the watershed, the U.S. Air Force at Hanscom (USAF) and the Merrimack River Watershed Council (MRWC) were engaged. With these two partners, a Watershed Team (the former Team) was convened, and began to meet quarterly in mid-1995. Soon after, a number of participating



personnel from the various EOEIA agencies became active participants in team activities.



Priority Issues and Activities

In 1995 Department of Environmental Protection (DEP) initiated its monitoring effort in the Shawsheen River. The results clearly indicated that bacterial contamination was predominant throughout the basin - 98% of all surface river (including tributaries) waters failed to meet Massachusetts' water quality standards. Simultaneously, another concern of equal importance came to light - flooding during heavy rainfall periods. This problem has escalated in recent decades, particularly in the mid-

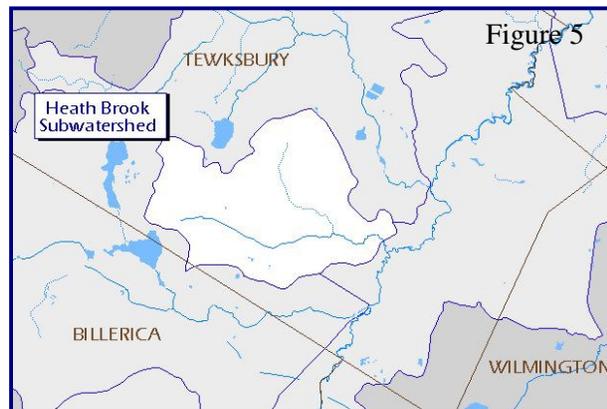
mainstream basin areas of Billerica, Tewksbury, and Andover. Over 100 residences were regularly flooded during large rain events, and half a dozen roads closed to traffic.



This DEP monitoring effort generated team interest in additional monitoring. Financial and other commitments were raised from a variety of sources to conduct extensive tributary area monitoring. Funds and project commitments were raised from The Merrimack River Watershed Council, The U.S. Air Force, Department of Fish and Wildlife and Environmental Law Enforcement (DFWELE), Riverways, Raytheon Corp., and several other partners to commandeer an overall \$250,000 two-year monitoring effort. The subsequent monitoring was conducted largely by trained stream teams, covering 90% of the entire basin with over 110 new monitoring stations.

Five basic parameters, including two bacterial, were selected. Proper QAQC protocols were developed and followed in the monitoring and the lab analysis phase. Also, extensive biological stream habitat monitoring, and river walk observations were conducted along with the parameter monitoring work. The finished data gave the team a much more comprehensive view of water quality throughout the watershed. One significant conclusion was that pollution problems are generally greater in the tributaries than in the mainstem sections. Approximately twenty pollution “hot spots” were determined, and referred to DEP and the communities for appropriate enforcement. Today, over a dozen of these hot spots have been cleaned up. A five-year DEP bacteria study in 2000 demonstrated some lowering of bacteria levels in the mid-basin areas of the mainstem, such that a five-mile portion of the river now meets water quality standards for bacteria levels.

Over the years the team has received up to \$100,000 in yearly monies for priority watershed projects. From 1998 through 2002, the team committed \$430,000 in total project funding to address its priorities. This includes pollution remediation projects, storm drain outfall mapping, Total Maximum Daily Loading (TMDL) studies on the mainstem and two major tributaries, flow water budget study, flood mitigation planning, riverbank erosion mitigation, recreation map, habitat studies, and stream team re-startup.



DFWELE completed a fish monitoring and habitat study on the mainstem watershed, and DEP NERO has spent countless days in the field helping to resolve the hot spot problems identified earlier. Additionally, the EOEA Wetlands Restoration Program completed a three-year assessment of wetland conditions throughout the watershed, and identified a set of 64 recommended sites for potential wetlands restoration.

It is significant to note that substantial monies have been leveraged as match to many of the projects, or to support very important ancillary projects. In particular, the U.S. Air Force at Hanscom has contributed well over \$100,000 in project monies to support additional “hot spot” pollution monitoring on-base, and to support a major habitat TMDL study with implementation recommendations for the Hanscom Base property. This is a “first of its kind” joint partnership effort of the team, USEPA Region I, DEP, USAF, MassPort, and Merrimack River Watershed Council (MRWC) in negotiating the conditions of and conducting the TMDL.

The Former Shawsheen River Watershed Team

The former Shawsheen River watershed team was initiated in 1996. It consisted of over 30 active attendees to quarterly meetings, and 55 members who participated based on issue and expertise. The team was comprised of the following representatives:

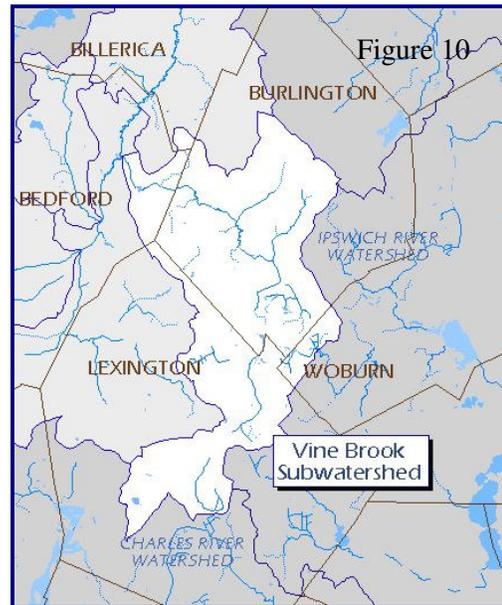
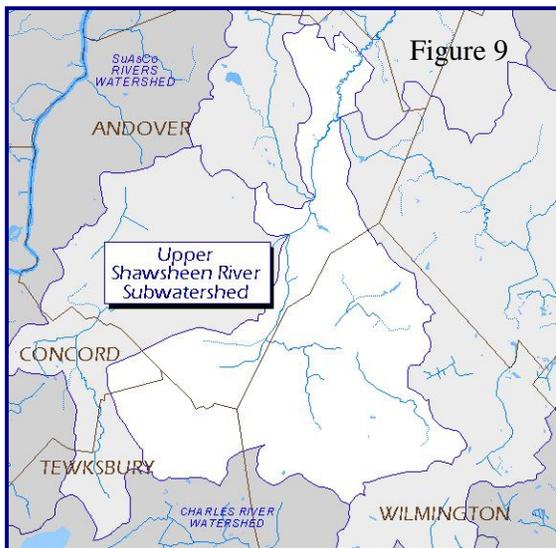
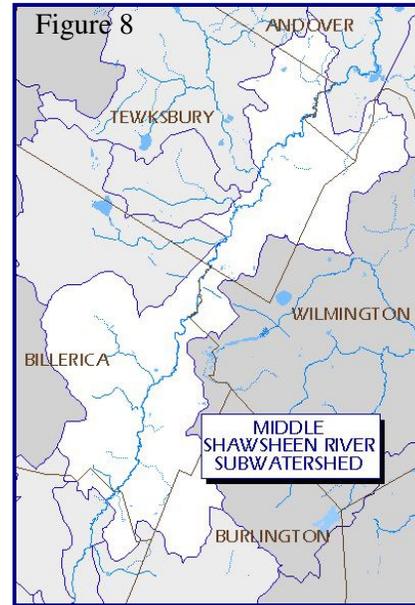
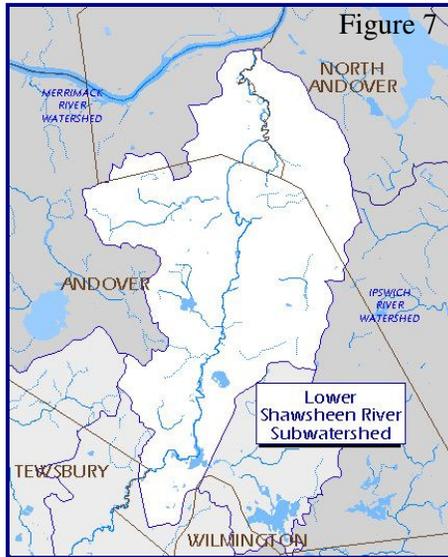
- EOEA agencies: DEP, DEM-Water Resources Planning, DEM-FEMA/MEMA Program, DFWELE-Assessment, DFWELE-Riverways, and OTA
- Federal agencies: EPA, U.S. Air Force, Army Corps of Engineers, National Park Service, Natural Resource Conservation Service, National Wildlife Federation, and U.S. Geological Survey
- Regional Authorities: Northern Middlesex Planning Commission, Merrimack Valley Planning Commission, and MassPort
- Communities: Andover, North Andover, Tewksbury, Billerica, Bedford, and Burlington.
- Local Watershed Associations: Shawsheen River Watershed Association, and Merrimack River Watershed Council
- Businesses: Raytheon, Mitre, Limno Tech, and Pioneer Valley Association
- Local citizens in the Watershed

In 1998, the former watershed team developed a formal 5-Year Watershed Action Plan (WAP). This document is a revision of that plan. The five goals outlined in 1998 were: water quality improvement; understanding flow and flooding; restoring fisheries; appreciating recreation opportunities; and developing a local river advocacy organization. Since the last iteration of the plan, the goals have been updated, revised and refined. The restated goals in this WAP are:

- Improve water quality
- Resolve flooding problems and protect water supply
- Restore habitats-wetlands restoration, and promote open space protection
- Promote recreation use and better public access to the river
- Promote outreach, education, and advocacy on watershed resources

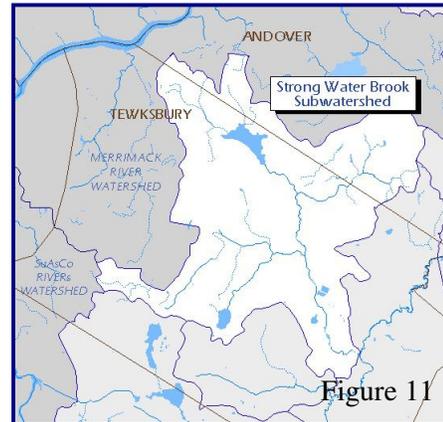


Shawsheen Subwatershed Maps



Watershed Associations

In the early 1970's a watershed organization, the Shawsheen River Watershed Association, was formed to address fears that contaminants were flowing off the Hanscom Air Force Base property into the mid-basin mainstem part of the river, and threatening the wildlife habitat that resided in the area. When contaminants were contained by the mid-1970's interest waned and the organization disbanded. Soon after, other citizen interest was resurrected in the mid- to late-1980's to address river pollution. The Shawsheen Watershed Environmental Action Team (S.W.E.A.T) was formed out of the need to clean up the river from all the years of neglect. Human-borne debris had accumulated on the sides and bottom of the river, from Bedford to Lawrence. Since 1990, this group has removed thousands of tires and hundreds of grocery store shopping carts from the river.



More recently, the years 1998 and 2001 witnessed flooding scenarios in the mainstem portions of the river. This promulgated a re-organization of a full-fledged watershed organization called the Shawsheen River Watershed Association. This organization began meeting monthly, formed its own charter and constitution, and became a viable 501c3 nonprofit organization in early 2001. Currently it has nearly 100 dues paying members and families. Besides the monthly meetings, the organization sponsors an active river debris cleanup program, a public awareness and education program on the river, a recreational canoe events program for the public, and is a representative river advocate at town meetings on various development issues that face the watershed. The organization has been instrumental in contributing to former team efforts associated with EOEPA priority projects. For instance, its most recent success is working to create a recreational map and web site showing all the opportunities that exist for citizens to fully enjoy the resources of the watershed. The map can be viewed at <http://www.shawsheen.org/recmap/index.html>.

CHAPTER 2 – GOALS AND OBJECTIVES

During the summer and fall of 2002 the Shawsheen River 5-Year Action Plan steering committee was formed. This committee included representatives from five area communities (Bedford, Billerica, Tewksbury, Andover, and Burlington), state agencies such as DEP, DFWELE, Riverways, DEM, and watershed associations such as the Shawsheen River Watershed Association and the Merrimack River Watershed Council. The steering committee revisited the 1998 Shawsheen five-year management plan, and began an update and revision effort. It was decided that the 2002 Shawsheen Assessment Summary would serve as the basis of the introductory chapters and information for the revised five-year action plan. The steering committee revisited each goal and objective. In 1998, the goals were:

- Clean water and protected aquatic ecosystems throughout the watershed
- A healthy and diverse fish population in the Shawsheen River Watershed
- Excellent recreational opportunities and accessibility to the rich environmental resources of the basin
- Protect and restore basin water resources, wetlands, and floodplains for the benefit of both the public and the natural environment, and
- Protection and restoration of the Shawsheen River and its tributaries based on an understanding of the whole Shawsheen River Watershed Organization (SRWO).

Several discussions ensued and based on the conclusions from the 2002 Shawsheen River assessment report, it was necessary to restate the goals as the following:

- Improve Water Quality
- Manage Flows
- Restore Wetlands and Healthy Habitats
- Promote Recreation Access/Use and Open Space, and
- Promote Outreach and Education on Resources in the Watershed

After the goals were established, the steering committee outlined objectives within each goal followed by the action strategy needed to realize each objective. This was based on the results from the assessment report as well as on the issues, priorities, and input received from the various towns and steering committee members.

GOAL # 1

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
<p>Improve Water Quality</p>	<p>Wastewater</p> <ul style="list-style-type: none"> Town sewerage versus Septic system Andover: 55%/45% Tewksbury: 30%/70% Billerica: 70%/30% Bedford: 95%/5% N. Andover: 95% Burlington: 90%/10% Lexington 90%/10% Septic System maps produced: Andover, Billerica, Tewksbury <p>Water Quality</p> <ul style="list-style-type: none"> Partially Meets: Dissolved Oxygen levels 6.0-9.0 mg/l. (Average) Does not meet fecal coliform standard 200 col/100ml (average levels 380-600 col/100ml) Suspended solids 3.0-6.0 mg/l. <p>Temperature/Warm Water Fishing</p> <ul style="list-style-type: none"> See 1996 Shawsheen Water Quality Assessment Report 1997 (2002 when available) Water Quality Assessment Report 	<ul style="list-style-type: none"> Attain fishable/swimmable Class "B" Water Quality Standards in tributaries by 2005 and in mainstem by 2010 Restore and protect the watershed so that 80% of tributaries will support healthy aquatic communities by 2005 and the mainstem by 2010 Eliminate point/nonpoint sources by 2010 Utilize SWAP program to assess threats of contamination of drinking water source waters 	<ul style="list-style-type: none"> Foster SRF priorities to assist towns with implementing sewerage plans, and fix failing septic systems <p><u>Andover:</u> Implement and/or design plans to sewer remaining 45% of town still on septic systems. Facilitate community Septic Management Program/ Inspections</p> <p><u>Tewksbury:</u> Implement town-wide sewer system master plan Identify septic system failure response mechanisms</p> <p><u>Billerica:</u> Implement town-wide sewerage program Identify septic system failure response mechanisms</p> <p><u>Bedford:</u> Require remaining septic systems to connect to sewers where feasible Fix septic systems unlikely to tie-in with existing sewer/inspection</p> <p><u>North Andover</u> <u>Lexington</u> <u>Burlington</u> Identify and require remaining septic systems to connect to sewers where feasible. Fix septic systems unlikely to tie-in with existing systems/inspection</p> <p><u>USAF and MassPort Based at Hanscom:</u> Water quality sampling, detect hot spots, find sources and fix</p>	<ul style="list-style-type: none"> Higher percent of waters meeting swimmable standards by 2005/2010 <ul style="list-style-type: none"> ➤ Lower percentage (from 45%) of town remaining on septic systems/increase percentage on sewers ➤ Numbers of septic systems are upgraded/repared ➤ Water quality improvements ➤ Lower percentage (from 70%) of town remaining on septic systems/increase percentage on sewers Test systems; number of systems are upgraded/repared ➤ Water quality improvements Lower percentage (from 50%) of town remaining on septic systems ➤ Test systems; number of systems are upgraded/repared ➤ >95% of town is sewerd Number of Septic systems, are upgraded/repared ➤ Water quality improvements ➤ Document number of tie-ins to sewers ➤ Number of Septic systems, are upgraded/repared ➤ Water quality improvements ➤ Number of repairs documented; follow-up water quality sampling –results show water quality improvement 	<ul style="list-style-type: none"> <u>Towns</u>, DEP-NERO, state agencies Andover, DEP-NERO, DEP-SRF, state agencies, Andover BOH <u>Tewksbury</u>, DEP-NERO, DEP-SRF, state agencies, Tewksbury BOH <u>Billerica</u>, DEP-NERO, DEP-SRF, state agencies, Billerica BOH <u>Bedford</u>, DEP-NERO, DEP-SRF, state agencies, Bedford, BOH <u>N. Andover</u> <u>Lexington</u>, <u>Burlington</u> DEP-NERO, DEP-SRF, state agencies, BOH <u>USAF</u>, MassPort, state agencies

GOAL # 1 (Continued)

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
Improve Water Quality			<ul style="list-style-type: none"> Identify thru EOEAs and Stream-Team monitoring, pollution Hotspots throughout the watershed 	<ul style="list-style-type: none"> Hot spots identified sources for pollution found and remedies applied to eliminate pollution. Water quality improvements 	<ul style="list-style-type: none"> Seven towns, state agencies, Nonprofit groups, DEP-NERO
			<ul style="list-style-type: none"> Towns to institute or carry out I/I reduction problems 	<ul style="list-style-type: none"> I/I reduced; WWTP influence, volumes affected 	<ul style="list-style-type: none"> Seven towns, state agencies, DEP-NERO
			<ul style="list-style-type: none"> NPDES Point-Source Control continues: one minor WWTP, nine non-contact cooling, groundwater permits 	<ul style="list-style-type: none"> Review DMR's for NPDES Compliance 	<ul style="list-style-type: none"> EPA Region I, DEP-NERO
			<ul style="list-style-type: none"> Continue TMDL, process basin-wide 	<ul style="list-style-type: none"> Implement recommendation (1) Mainstem TMDL; (2) Vine Brk. TMDL; (3) Elm Brk. TMDL complete TMDL studies; Sutton Brk., Strongwater Brk., Content Brk., Roger's Brk. 	<ul style="list-style-type: none"> State agencies, DEP-NERO
			<ul style="list-style-type: none"> Integrate data and recommendations from all TMDL studies 	<ul style="list-style-type: none"> Begin to apply TMDL recommendations <u>Result:</u> Higher percentage of waters meeting Class B Swimmable Standards 	<ul style="list-style-type: none"> State agencies, DEP-DWM, DEP-NERO
			<ul style="list-style-type: none"> Increase field surveys/monitoring of segments to identify specific pollution sources. (All sampling data meets QAPP Standards) 	<ul style="list-style-type: none"> Number of river segments meeting Class B Swimmable Standards for DO, Fecal Coliform increases. (DEP approved QAPP) 	<ul style="list-style-type: none"> State agencies, DEP-DWM
			<ul style="list-style-type: none"> Continue flow studies to determine impact on water quality 	<ul style="list-style-type: none"> Future flow-flooding mitigation BMP's are also identified to impact pollution reduction 	<ul style="list-style-type: none"> State agencies, DEP-DWM

GOAL # 1 (Continued)

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
Improve Water Quality	Stormwater <ul style="list-style-type: none"> Phase I Stormwater regulations applications “Spotty” at best Storm drain cleaning varies from sometimes to none Street sweeping occurs late spring only A lot of current pollution from stormwater runoff 	<ul style="list-style-type: none"> Implement nonpoint source pollution controls Reduce sediment transport to river 	<ul style="list-style-type: none"> Implement Phase II Stormwater regulations in each of seven towns: <ol style="list-style-type: none"> Map drains, system and outfalls Expand frequency of street sweeping Water Quality monitoring to measure pollution levels BMP’s at principal stormwater outfalls to reduce pollution Strict construction site BMP requirements by towns Incorporate TMDL objectives and targets 	<ul style="list-style-type: none"> Stormwater systems pollution reduction; Number of tributary river systems meeting Class B standards increases from Stormwater controls by 2008 Sediment loads decrease in water column 	<ul style="list-style-type: none"> Towns, state agencies, nonprofit groups, DEP-NERO Towns, state agencies, DEP-NERO
	<ul style="list-style-type: none"> Wildlife, particularly birds (geese) and pets contribute to bacteria contamination 	<ul style="list-style-type: none"> Reduce pollution effects of wildlife waste 	<ul style="list-style-type: none"> Seven-community (basin-wide) identification of wildlife, including beavers and their possible contribution to pollution levels. Population control of Geese 	<ul style="list-style-type: none"> Programs to reduce wildlife and pet contributions to pollution 	<ul style="list-style-type: none"> Towns, Citizens, state agencies, nonprofit groups
	<ul style="list-style-type: none"> Eutrophication problems 	<ul style="list-style-type: none"> Determine and resolve sources of lake and pond pollution problems: Fawn Lake, Bedford, Fosters Pond, Round Pond Tewksbury 	<ul style="list-style-type: none"> Eutrophic conditions become oligotrophic/mesotrophic 	<ul style="list-style-type: none"> Citizens, EOE Team, SRWA 	
	<ul style="list-style-type: none"> Portions of river strewn with tires, shopping carts, etc. 	<ul style="list-style-type: none"> Reduce litter in the river 	<ul style="list-style-type: none"> River-wide debris “maintenance clean-up,” and public education/awareness to keep river clean 	<ul style="list-style-type: none"> Improved appearance of river from particularly human-borne trash and debris 	<ul style="list-style-type: none"> Citizens, nonprofit groups, team
		<ul style="list-style-type: none"> Continue clean up of waste sites 	<ul style="list-style-type: none"> Complete remedial waste site/former landfill areas: Schaeffer Landfill, Rocco-Sutton Brook areas 	<ul style="list-style-type: none"> Attainment of appropriate cleanup standards at sites in the basin according to regulatory timelines 	<ul style="list-style-type: none"> DEP-NERO, EPA Region I

GOAL # 2

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
Manage Flows	<ul style="list-style-type: none"> • Current total WMA Registered withdrawal volume: 5.1 mgd (7.89 cfs) 	<ul style="list-style-type: none"> • Protect current and future public water supplies 	<ul style="list-style-type: none"> • Identify stakeholders such as large volume water users and withdrawals in the basin 		<ul style="list-style-type: none"> • DEP, state agencies, nonprofit groups
	<ul style="list-style-type: none"> • Actual reported 2001 usage: 3.89 mgd (6.02 cfs) 		<ul style="list-style-type: none"> • Collect and evaluate existing information on land use, withdrawal locations, wastewater discharge locations, aquifers, and recharge areas 		<ul style="list-style-type: none"> • DEP, state agencies, nonprofit groups
	<ul style="list-style-type: none"> • Difference between actual and registered withdrawal volumes: 1.21 mgd (1.87 cfs) 		<ul style="list-style-type: none"> • Determine what sub-basins are the most stressed due to withdrawals and reduced recharge 		<ul style="list-style-type: none"> • DEP, state agencies, nonprofit groups
	<ul style="list-style-type: none"> • Watershed area: 78.16 sm • Recharge basin volume: 50.9 mgd (1.01 cfsm) 		<ul style="list-style-type: none"> • Identify critical recharge areas and areas subject to impacts from groundwater withdrawals 		<ul style="list-style-type: none"> • DEP, state agencies, nonprofit groups
	<ul style="list-style-type: none"> • 7Q10 flow -0.083 cfs 		<ul style="list-style-type: none"> • Work with towns to assure recharge of stormwater to groundwater for new construction/redevelopment projects in the basin in accordance with the stormwater regulations. 	<ul style="list-style-type: none"> • Reduction of possible impervious surfaces in basin or compensate the effect of increased imperviousness than BMP's 	<ul style="list-style-type: none"> • DEP, state agencies, nonprofit groups, Town Planners, Con. Comms
	<ul style="list-style-type: none"> • Estimated excess aquifer capacity available for new withdrawals (assuming registration withdrawals and maintaining 7Q10 flows) - 41.48 mgd (64.64 cfs) 		<ul style="list-style-type: none"> • Define basin-wide conservation goals based on low flow condition, predicted future demands and registered withdrawals volumes 	<ul style="list-style-type: none"> • Increase in average water levels measured at USGS staff gage and 7Q10 values established by USGS for the basin 	<ul style="list-style-type: none"> • USGS, individual business owners, DEP, state agencies
	<ul style="list-style-type: none"> • WMA Site Screening Criteria for new withdrawals over 100,000 gpd 		<ul style="list-style-type: none"> • Recommend implementation of conservation activities by public water suppliers, individual consumers, and large volume water users throughout the basin, especially in stressed sub-basins 	<ul style="list-style-type: none"> • Reduction in volume of water consumed (demand) on public water supply 	
			<ul style="list-style-type: none"> • Provide outreach on household water conservation methods to consumers in basin 		
	<ul style="list-style-type: none"> • Review and comment on new public water supply withdrawals and large volume withdrawals in the basin during Water Management Act permit application reviews 	<ul style="list-style-type: none"> • Number of new water conservation by laws passed by the towns in basin 			

GOAL # 2 (Continued)

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
Manage Flows			<ul style="list-style-type: none"> Track additional withdrawal volumes and wastewater discharges in basin in relation to estimated excess aquifer capacity 		
			<ul style="list-style-type: none"> Identify and evaluate risks posed by land uses within the source protection area for current public water supply sources and make recommendations to the public water supplier for improvement to water supply protection efforts 	<ul style="list-style-type: none"> Issue Source Water Assessment Reports to public water suppliers and provide technical assistance for improvements to protection efforts 	<ul style="list-style-type: none"> DEP, public water suppliers, town planners, nonprofit groups, state agencies
	<ul style="list-style-type: none"> River Floods with rains $\geq 1''$ in 24 hours River floods and causes damage with rains $\geq 3''$ in 24 hours River floods severely in > 20-year Flood Events 	<ul style="list-style-type: none"> Decrease flooding, damage during storm events throughout watershed 	<ul style="list-style-type: none"> Redo FEMA flood maps in areas subject to reoccurring flooding Develop and institute basin-wide Flood Management Plan Pursue recharge opportunities in Basin through implementation of Wetlands Protection Act and Rivers Protection Act requirements and BMPs for new or redevelopment construction projects 	<ul style="list-style-type: none"> Reduction in duration and extent of flooding events Instituting Flood Management Plan increases Flood Storage/Retention/Wetland total acreage by 5% by 2007. (This increases overall flood storage capacity by 10%) 	<ul style="list-style-type: none"> State agencies, seven towns, DEP, nonprofit groups
	<ul style="list-style-type: none"> Dry weather cycles, river flow at Wilmington Gauge (2 cfs) Much of river not navigable. Portions dry up Hanscom and Bedford 	<ul style="list-style-type: none"> Increase flows, during dry weather regimes, to support native flora and fauna and provide recreational opportunities 	<ul style="list-style-type: none"> Obtain additional passive use open space in basin through acquisition or easement Increase flood storage capacity within basin through wetland restoration efforts and other BMP's Continue river debris cleanups including controlling beaver related problems Reduce percentage of impervious surfaces in watershed Increase perviousness of existing surfaces 	<ul style="list-style-type: none"> Reduction in extremes observed in river hydrographs Dry weather flows: ≥ 3 cfs, Wilmington Gauge 1 cfs Hanscom Gauge Completion of wetland restoration projects Improved drainage/regular flows in river and tributaries/beaver solution Reduce growth of impervious cover/reduce overall impervious cover Increase perviousness generally 	<ul style="list-style-type: none"> State agencies, seven towns, DEP, nonprofit groups

GOAL # 2 (Continued)

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
Manage Flows		<ul style="list-style-type: none"> Mitigate flooding, etc. 	<ul style="list-style-type: none"> Maintain, retrofit culverts and other flow structures Rehabilitate existing drainage easements to maximize recharge 		<ul style="list-style-type: none"> EOEA, DPW's of towns, Conservation Com., nonprofit groups, consultants, property owners
	<ul style="list-style-type: none"> Beavers currently build dams throughout watershed and exacerbate numerous backyard/basement flow backup problems, and other flow backup problems in watershed 	<ul style="list-style-type: none"> Control Beaver related flooding problems 	<ul style="list-style-type: none"> Carry out beaver and people team project in 2003 which incorporates technologies to re-establish regular flows in rivers Extend further EOEA and town efforts regarding beaver problems and control in FY '05 and beyond 	<ul style="list-style-type: none"> Less flow back up problems documented in every town in watershed 	<ul style="list-style-type: none"> State agencies, DFWELE, nonprofit groups, towns
Manage Flows <i>Bedford</i>	<ul style="list-style-type: none"> Flooding Issue (Town of Bedford) Town-Wide Drainage Study 2000-2001 Number of perennial streams in Bedford 	<ul style="list-style-type: none"> Reduce property damage avoid road closures Maintain base flows in perennial streams 	<ul style="list-style-type: none"> Continue to implement recommendation from town-wide Drainage Study Encourage increasing flood storage at Hanscom Field Perform annual stream and brook clean-ups under DPW's Generic Order of Conditions for drainage improvement Reduce winter sand from depositing at culverts and outlets which can redirect the natural flow of the river/brook Monitor beaver activity Divert channels as needed via new brooks or pipe networks 		<ul style="list-style-type: none"> Town of Bedford, state agencies Town of Bedford, state agencies Town of Bedford, state agencies, nonprofit groups Town of Bedford Town of Bedford, DFWELE, nonprofit groups Town of Bedford
Manage Flows <i>USAF, MassPort Hanscom</i>	<ul style="list-style-type: none"> Potential stormwater release from entire property in 20-years storm: 2000-acre feet 	<ul style="list-style-type: none"> Minimize/detain flash runoff flows from storm 	<ul style="list-style-type: none"> Base-wide (Hanscom) detainment/containment and wetlands restoration 	<ul style="list-style-type: none"> ≥ 3" storm reduce flows to ≤ 5 cfs at Hanscom Gauge 	<ul style="list-style-type: none"> USAF Hanscom, MassPort, state agencies

GOAL # 3

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
Restore Wetlands and Healthy Habitats	<ul style="list-style-type: none"> •River mainstem in varying degrees of “Litter Cleanliness” •SRWA has been active with warmer seasons clean up program •Much of 17 miles mainstem has been cleaned at least once •N. Andover, S. Lawrence portion is recent activity focus •Need public awareness for Anti-Littering Campaign •33% reduction in healthy wetland acreage since 1950 	<ul style="list-style-type: none"> • Intensify cleanup efforts by getting more people involved at the same time • Instituting public awareness campaign on anti-littering • Extend work of EOEA WRP study efforts 	<ul style="list-style-type: none"> •River cleanups/litter, tire removal •Removal of stream channel debris (fallen trees, etc.) •Educate public on impacts of improper disposal practices on WQ •Wetlands restoration •Provide input on project reviews that will result in destruction of wetlands in the basin, track amount of wetland areas being destroyed through individual projects •Redo FEMA maps to reflect changes in stream channel and floodplains •Stabilize stream bank erosion 	<ul style="list-style-type: none"> •Improvement of WQ in degraded segments of river •Less visible signs of human-borne trash/debris •Visible signs of erosion lessens 	<ul style="list-style-type: none"> •Citizens, 7 Towns, nonprofit groups, state agencies •DEP, NERO, Seven towns, Con Comms •State agencies, DEM/FEMA, MEMA •State agencies, consultants
	<ul style="list-style-type: none"> • Shawsheen River Watershed Wetlands Restoration Plan 	<ul style="list-style-type: none"> • Implement plan •Develop list of additional restoration sites 	<ul style="list-style-type: none"> •Develop list of additional restoration •Incorporate restoration in major development projects •Incorporate minor restoration efforts in minor residential project •Contact state and federal agencies with land in Bedford to implement restoration 	<ul style="list-style-type: none"> •Individual sites restored: Lexington •Three in Tewksbury (one on Tewksbury State Hospital land) •Bedford 	<ul style="list-style-type: none"> • State agencies, seven towns including Bedford and Hanscom, MassPort, Mass Highway
		<ul style="list-style-type: none"> •Identify and restore additional altered wetland wildlife habitats 	<ul style="list-style-type: none"> •Use National Wetlands Inventory to identify suitable areas for expanding specific wetland habitat types 		<ul style="list-style-type: none"> • All seven towns, DFWELE
		<ul style="list-style-type: none"> •Develop Town-based restoration plan for wetlands, floodplains and wildlife habitats 	<ul style="list-style-type: none"> •Rekindle USF&W proposal to extend great meadows wildlife sanctuaries into upper Shawsheen area 		<ul style="list-style-type: none"> • Bedford

GOAL # 3 (Continued)

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
Restore Wetlands and Healthy Habitats	•Lands altered due to recent developments	•Restore wetlands in Tewksbury: 1) Near Popular St. 2) Near Livingston St. 3) Near Main St.	•EOEA future project, with town match support	•Project finalized FY '04 or '05	•Tewksbury, state agencies, EOEA WRP
	•Tewksbury State Hospital (250 acres)	•Conservation restrictions imposed on state-owned lands	•Soil erosion prevention, other land protections imposed	•Soil erosion lessened, destructive land uses lessened	•Tewksbury Con Com, state agencies, nonprofit groups
	•Purple loosestrife, other invasive species evident	•Control non-native invasive species	•Introduce beetles to eat loosestrife •River cleanups pulling loosestrife	•Reduction in loosestrife	•State agencies, nonprofit groups, citizens
	•Lack of diversity	•Improved native fauna	•River cleanups, wetlands restoration, and improvements	•Presence of: Kingfisher, Herons, Hawks, Osprey, Owls	•State agencies, DF&WLE, nonprofit groups, citizens, towns

GOAL # 4

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
<p>Promote Recreation Access / Use</p> <p>Protect open space</p>	<ul style="list-style-type: none"> •Some official access to river, e.g., hiking trails, etc. •No formal state-approved river access point •Most access is unofficial and could be lost •River is canoeable through entire mainstem 	<ul style="list-style-type: none"> •Develop access that is: <ul style="list-style-type: none"> - permanent - protected - safe - easy to use - handicapped accessible - plenty of parking - ramps for canoes/car-top boats 	<ul style="list-style-type: none"> •Research public access laws •Contact town officials in each town to get lists of official town sites/get formal approval of these sites •Publicize loan newspaper articles regarding approved sites •Add information to web based RGC Map •Post signs at approved access sites •Formalize partnerships with other local environmental organizations, i.e., Bay Circuit Trails, AVIS, Andover trails to share access opportunities •Promote increased recreational use of river on local media: town web site; local newspaper; Cable TV •Work with state, public access board to establish state-approved site(s) •Town/EOWA effort to develop a Shawsheen Watershed Open Space Plan 	<ul style="list-style-type: none"> •Number of officially (town) recognized points to river, trails, public right-of-way •Number of people using river via access points increases •Signs posted •Attendance at nonprofit organized canoe trips, forums, and other events increases •Nonprofit membership increases •A state-approved access site by 2006 	<ul style="list-style-type: none"> •Nonprofit groups, state agencies, DFWELE •IBID •Nonprofit groups •Nonprofit groups, state agencies, DFWELE •Nonprofit groups •Nonprofit groups, state agencies, Public Access Board •State agencies, seven towns, nonprofit groups •Towns, citizens, nonprofit groups, state agencies •Bedford, citizens, nonprofit groups
	<ul style="list-style-type: none"> •Seven towns Open Space Planning process at various stages. At least 4 have DCS state approval •No watershed wide open space planning has occurred •Town of Bedford Open Space Planning •1997 Bedford Open Space and recreation Plan approved by DCS •2002 update established and approved 	<ul style="list-style-type: none"> •Conduct basin approach to Open Space Planning and acquisition •Towns current plans: Foster maximum Open Space Acquisition Grants through towns, state DCS Self-Help Program •Bedford: Improve access to existing Open Space and recreation Facilities and Grounds 	<ul style="list-style-type: none"> •Land Acquisition Proposal offered at town meetings, Self-Help (DCS) applications completed •Improve the access road and walking trail to Springs Brook Park 	<ul style="list-style-type: none"> •Funding received/formal plan developed •Increase in lands in all of towns in permanent Open Space Protection •Improvements made, more access available, and greater use by citizens. 	

GOAL # 4 (Continued)

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
<p>Promote Recreation Access/Use</p> <ul style="list-style-type: none"> • Protect open space 		<ul style="list-style-type: none"> •Bedford – Improve access to river and streams 	<ul style="list-style-type: none"> •Bedford – Establish important public access points for fishing and canoeing by land purchase and/or easement rights •Develop canoe access to the Shawsheen River •Improve Handicapped accessibility by compliance with the American With Disabilities Act 	<ul style="list-style-type: none"> •Bedford – Better access for citizens •More use by citizens •Handicapped Accessibility is established 	<ul style="list-style-type: none"> •Bedford: DFWELE
	<ul style="list-style-type: none"> •DFWELE study conducted 1997 recommendations are forthcoming 	<ul style="list-style-type: none"> •Foster fishing of the river by citizens 	<ul style="list-style-type: none"> •Publicize DFWELE study and recommendations •Upgrade stocking by DFWELE 	<ul style="list-style-type: none"> •Fishing opportunities are increased throughout watershed 	<ul style="list-style-type: none"> •State agencies, town, nonprofit groups

GOAL # 5

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS
Promote Outreach and Education on Resources in the Watershed	•Existing watershed organization: SRWA	•Promote SRWA Organization	•Increase memberships, more activity involvement SRWA	•More members, programs	• All citizens, state agencies
	•Recreational map/brochure and website established	•3000 recreational map/brochure; Make 500 new copies	•Distribute to seven towns, all schools	•Use of map increases use of basin resources increases	• Nonprofit groups, state agencies
	•SRWA sponsored public forums 3 times per year	•Plan year's programs: Dam removal; invasive species; habitat protection; beaver mediation	•Three forums organized per year	•Increased knowledge about watershed by citizens	
	•River Smart Activities	•Develop watershed education plan	•SRWA and EOEa sponsored project: Environmental Ed, including teacher training K-12	•More Environmental literacy of watershed resources in Schools	• State agencies, nonprofit groups
	•Some Environmental ED. in schools	•Encourage watershed protection curriculum in schools			
	•Littering in watershed continues	•Develop anti-littering campaign	•Conduct anti-littering campaign	•Less total visible littering in the river	• Nonprofit groups, state agencies, all citizens
		•Post signs identifying river/brook	•Carry out FY'02 team project: make/install 42 signs at road crossing	•Signs are posted	
		•Educate citizens on water conservation, back yard housekeeping impacts and stormwater runoff impact to WQ	•Stormwater Phase II activities by EOEa •Public Programs, Cable TV shows, Newspaper articles	•Improvements seen in backyard litter problems	
	•Publicize impacts of illegal stream dumping practices	•Cable TV, Newspaper Articles and Photographs	•Number of dumping incidents publicized		

GOAL # 5 (Continued)

GOALS	CURRENT BASELINE STATUS	OBJECTIVES	ACTIONS	INDICATORS	RECOMMENDED PARTICIPANTS	
Promote Outreach and Education on Resources in the Watershed		•Develop advocacy programs with businesses in basin	•Try to elicit business support in SRWA programs	•Monies, support for SRWA are raised		
		•Develop partnership with LWV on pesticide, NPS reduction efforts	•Cable TV, Newspaper Articles			
		•Promote recreational use of river	•Map, website, and SRWA canoe/recreation events	•Increase in number of citizens enjoying river		
		•Request assistance from RPAs for town basin-wide planning efforts	•Involve RPA representatives in SRWA meetings and programs	•RPA Representatives active at SRWA		
Town of Bedford (Component to Plan)						
Promote Outreach and Education on Resources in the Watershed	•Conservation Commission web site	•Maintain and improve site	•Designate site manager		•Conservation Commission	
	•1997 Bedford Open Space and Recreation Plan	•Create, update, and disseminate information regarding the town's open space and recreation resources	•Complete links to trail maps		•Town GIS Stewards	
	•2002 Update		•Continue to map trail systems and conservation area		•Conservation Commission, stewards, town;	
	•Bedford Conservation Land Stewards	•Improve management and maintenance of conservation areas	•Develop seasonal interpretive programs that can provide nature walks through the conservation lands to increase public awareness		•Support and expand the Bedford Conservation Land Stewards Program	•Conservation Commission
	•Conservation Walks	•Provide more frequent scheduled walks	•Encourage stewards, residents and special groups to sponsor walks		•Encourage stewards, residents and special groups to sponsor walks	•Conservation Commission, stewards
		•Create wider appreciation of the Shawsheen River	•Develop a "Shawsheen River Day" program		•Develop a "Shawsheen River Day" program	•Town, nonprofit groups
	•General Public Information	•Reach larger numbers of residents	•Bedford Byline Articles		•Bedford Byline Articles	•Town

CHAPTER 3 – ACTION PROJECTS

The Shawsheen 5-Year WAP Steering Committee met several times from September-December 2002. Detailed input was received from representatives from 5 area towns.

The committee generated 5 pragmatic action projects - one for each of the goals - which give specific guideposts of action that can be implemented in the future. Detailed scopes of each of these projects need to be further developed over the next several years. The specifics of each action project may be adapted and modified over time.

Action Project #1 – Improve Water Quality

Water pollution control and reduction will continue to be a top priority in the watershed. TMDL modeling and implementation, in conjunction with the newly established EPA Phase II Stormwater Pollution Control Program, will be the main area of focus. The success of reducing pollution will be coalescing these two efforts together, since the remaining pollution sources in the Shawsheen Watershed are for the most part nonpoint source/stormwater in origin. TMDL implementation activities will largely control stormwater runoff sources required under Phase II.

TMDL implementation studies are currently being completed on the mainstem, and on the Hanscom AFB/MassPort property. Studies are underway on the Vine Brook and the Elm Brook tributaries. Future studies will be required on Sutton and McKee, Stormwater, Content and Rogers Brook tributaries. Following these studies and their recommendations, TMDL implementation will begin.

Phase II communities can be assisted through funds to implement their individual stormwater management plans, which must be prepared and submitted to EPA/DEP by March of 2003. The communities will then have five years to fully implement these plans. Phase II communities include: Lawrence, Burlington, North Andover, Tewksbury, Billerica, Bedford, and Lexington. Communities can be helped with addressing Phase II requirements through: (1) training municipal personnel to implement regular schedules on housekeeping practices such as street sweeping, storm catchment basin cleaning, and town maintenance yard cleaning; (2) develop, with town personnel, appropriate BMP's such as Stormtreat™, and wetland swales at principal outfalls; (3) work with private developers/property owners on developing and installing BMP's in water flow easement areas; (4) assist towns/developers with BMP's at construction/pose construction sites; (5) develop and implement water quality monitoring at key sites; (6) identifying where septic system failures negatively affect stormwater runoff; and help communities to rectify these failing systems; (7) educating citizens on proper disposal/recycling of backyard and pet wastes; and (8) possible studies on negative effects of wildlife on stormwater quality, and possible future controls.

Interestingly, all of these 8 activities address aspects of TMDL implementation recommendations from the TMDL modeling work already completed in mainstem portions. By addressing these 8 activities, the state and EPA requirements on both TMDL and Phase II Stormwater Pollution Controls will be satisfied.

Intricately related to both carrying out TMDL and Phase II requirements are conditions and changes in the domestic waste disposal process in all communities. At least 50% of the watershed is sewered to wastewater treatment plants. The remainder is unsewered or on domestic septic systems. However, in the next 10 years, another 30% of the unsewered portion of the watershed is expected to be sewered. This alone, should dramatically improve water (particularly groundwater) quality throughout the watershed. There needs to be a focus on the remaining septic systems, such that towns develop effective statistics on the whereabouts of septic systems, and identify septic system failure response mechanisms. In conjunction with this is the need for an effective anti-littering outreach and education effort aimed at the schools and the public-at-large.

Action Project #2 – Control Flows

The prime impetus for citizen concern in the watershed has arisen from mainstem flooding events. In fact, there have been three major events of 20-year flooding magnitude in just the past decade. Considerable building damage has occurred in the mainstem floodplain in Bedford, Billerica, Tewksbury, Andover, and North Andover during each of these events. The Shawsheen River Watershed Association began organizing in 1997 principally to address the flooding issues and concerns.

Low river flows during dry weather regimes has also sparked citizen and team concerns. The river has become unnavigable by boat or canoe due to low flows during parts of four summers the past decade. Not only the human dimensions of dry to non-existent flows become evident, but the damage to flora, fauna, and fish habitats are catastrophic during these dry weather cycles.

The former Shawsheen watershed team began addressing water flow issues with MWI funding in 1999-2000 by first conducting a water budget analysis (inflow-outflow) of the entire watershed. Through this analysis it was determined that increased land development over the past 40 years, with associated increase in impervious surfaces cover, has greatly exacerbated the fast, flash flows during heavy rains, and alternately exacerbates low base re-charge flows (via groundwater) during extended dry weather periods. So, the river rapidly floods more acutely and often compared to the period before 1960, and alternately shows more signs of drying up during extended dry weather cycles. Groundwater base-flow recharge is vastly reduced during dry cycles simply because rainwater during rainy periods simply is not being absorbed into the subsurface water table.

The team proposes a series of flow related projects to address the alternative flooding and low base-flow conditions. First, a flow model needs to be developed to better forecast flow conditions based on precipitation and land-use patterns. To do this, all Shawsheen FEMA-MEMA floodplain data needs to be updated. Once the model is developed, a flood mitigation management plan needs to be created and implemented. This management plan and implementation program needs to be basin-wide, beginning with the Hanscom property, and including the Towns of Bedford, Burlington, Billerica, Tewksbury, Andover, and North Andover. The implementation program will include a myriad of different BMP measures, including wetlands restoration and creation; surface and subsurface detention basins/detainment areas; catchbasin redesign to retard rapid runoff; new open space acquisition; strict local ordinances restricting new building in 100 year floodplains; culvert re-designs at road crossings; and making existing impervious surfaces more pervious.

Millions of dollars will be required from various grant sources to assist the towns, such as: Army Corps of Engineers, State Revolving Fund, state and federal agencies, including the U.S. Air Force, regional agencies, such as MassPort, and the towns. The overall impetus of all these projects is to increase the ground's ability to absorb and hold rainwater throughout the watershed. This will help address flooding problems during high rainfall and runoff periods. More water storage in groundwater from rain events means more water potentially available to re-charge base-flows during dry weather, which translates to more recharge of rivers and tributaries, and higher flows during dry weather.

One ancillary program to help address the need of increasing base flows during dry weather will be utilizing parts of town Phase II Stormwater Management Plans to reduce stormwater pollution. However, some parts of these plans (BMP's) can also be used for water retention. Examples include: surface and subsurface retention basins, bio-remediation, creation of wetlands (including wetlands restoration), and Stormtreat™ techniques.

Another process that can be used to reduce surface runoff/increase groundwater base flows is application of Low Impact Development (LID) principles. For example, reducing roadway widths and driveway surface areas, more greenspace, interspersing forests, swales between houses and pavement surfaces, and using porous type surfaces for sidewalks and driveways.

A project to help communities and developers to incorporate relevant Phase II and Low Impact Development practices into future development projects is necessary. Recommendations for changes in town by-laws and zoning ordinances may be part of this project.

Action Project #3 – Improve Habitats/Open Space Protection

In May of 2002 the Mass. Wetlands Restoration Program completed the *Final Shawsheen River Watershed Wetlands Restoration Plan*. The plan presents the Shawsheen Watershed communities with maps and summary descriptions of 63 potential wetland restoration sites. MWRP has determined that these sites likely contain historically damaged or destroyed wetlands that, if restored, could produce significant environmental benefits. The overall goal of the plan is to help communities and watershed stakeholders locate and assess important restoration opportunities, and work with MWRP and other restoration partners to complete some of the most promising projects.

The sites identified in the plan are destroyed or severely degraded wetlands that offer practical, physical opportunities to restore wetland structure and functions. Within this highly developed watershed, MWRP found that typical restoration opportunities consist of small areas of historically filled and degraded wetlands that have the potential to be restored back to health. Despite the apparent physical restoration potential of these sites, other considerations such as private ownership, contamination issues, and high per-acre project costs present new challenges for project sponsors and restoration advocates.

Considering these factors, the 63 sites were ranked into three priority groups with 15 sites in the highest priority group. Two of these sites already have preliminary feasibility and design work underway. Site feasibility research needs to be conducted on the remaining 13 sites. The detailed information gathered will be used to further rank the sites and select the most realistic and ecologically beneficial sites. It is expected that five to seven will be selected for further analysis. After additional information is gathered, one of two of the highest priority sites will be selected for development of full design and project implementation. Additional funding will be required for construction.

MWRP through its Shawsheen Watershed wetland restoration planning process has targeted 13 potential project sites as high-priorities for systematic follow up work and project development. A feasibility study is required to assess the 13 highest priority sites and select two from this list to develop preliminary restoration implementation plans. Further, implementation plans for the other priority sites are necessary. Additional funds must be raised to carry out the developed implementation plans.

Further work will look at second, and possibly the third, priority groups in the total final list of 63 sites. Feasibility studies will be conducted, and preliminary plans drawn up for those sites that make the most sense for implementation.

Other habitat protection and restoration efforts will center around wildlife and fisheries. Beavers have been a problem throughout the watershed, and will be addressed by a beaver program, and a continuing team-sponsored “Beaver Solutions” Project offered to communities in the watershed to help them live with beavers, and at the same time, resolve beaver caused problems. Other habitat issues in the watershed will be addressed by the Shawsheen River Watershed Association community forums on subjects such as owls, other native species of interest, invasive species,

problems, and solutions. Fisheries will be addressed through recommendations coming from a Department of Fish & Wildlife Fish Assessment Study in 1998.

An ancillary, but very important concern of EOE and the Shawsheen River Watershed Association is riverbank erosion at several sites along the river.

Open space and greenspace protection will be addressed through the development of a watershed-wide open space plan. The former team sponsored several open space seminars in communities in 1999, and found that all seven communities were at various stages of developing their own town open space plans. At least five of the seven had plans officially approved by the State Division of Conservation Services. In addition, the Town of Tewksbury has sponsored legislation to make the 300-acre state hospital property a conservation protection area. There has been no regional effort yet to pull all the plans together and formulate a watershed-wide open space plan. One thought advanced by the former team is to attempt to develop a continuous greenspace corridor alongside the mainstem from North Bedford to Balladvale Dam in Andover (13 miles). This would be similar to a project completed along the Westfield River in the mid 1990's. This project set up a continuous open green space coordinator along the mainstem, linking hiking trails, river access points, and historical sites through a continuous strip of land along the river for citizen posterity and use. As a result of this project, The National Park Service officially designated the Westfield as a wild and scenic river in its National Registry. A similar project is envisioned for the Shawsheen River mainstem.

Action Project #4 – Promote Recreation Use/Develop More Access to River

Although water quality flow management, and habitat restoration are fundamentally important to the team, an important “raison d’etre” for the desired improvements of these concerns is so citizens can experience the river and its surrounding environments through recreational and aesthetic appreciation and enhancement. The membership of the Shawsheen River Watershed Association (and prior to that, the Shawsheen Watershed Environmental Action Team) has for years sponsored recreational activities all along the mainstem of the river from Bedford to Lawrence. Specifically, canoe/kayak trips and races picnicking, and trail walks have been sponsored.

In order to canoe/boat on the river, the SWEAT/SRWA Organizations have had to remove a lot of debris (trees, tree limbs, as well as human debris/garbage) every year to keep the 16 mile stretch, from Bedford to North Andover in navigable fashion. Frequent schedule river cleanups have given participants a learning appreciation of the positive value of the river. Also, two very active trail building/maintenance organizations (A.V.I.S. in Andover, and Bay Circuit, Essex County) have constructed and maintained an interconnected system of trails linking North Andover, Andover, and Tewksbury. Perhaps, of greatest significance in the history of the team and the SRWA is a project whereby the SRWA and Geosyntec consultants (Boxborough, MA) together developed a map/guide brochure, and a web site, of recreational resources throughout the watershed. This includes boating, hiking, fishing, historical, parks, and natural public areas for enjoyment. This is available on the SRWA web site at www.shawsheen.org.

There is much more, in the future, that needs to be accomplished to further promote recreational opportunities for citizen benefit. Although there are several, informally defined, public access points along the river, much needs to be done to make public access more formalized, and increase the possibilities for more citizen visitation and use of the river. EOEA and the SRWA need to work with each of the communities along the mainstem portion to identify and/or develop formally defined public access points, including areas for public parking. Monies need to be raised so the towns can construct access boat ramps/landings, public parking for vehicles, and adequate rest facilities. The goal of EOEA and SRWA is to have at least one formally defined public access area to the river in Bedford, Billerica, Tewksbury, Andover, and North Andover (at least two sites are needed in Tewksbury and Andover). Additionally, the EOEA Public Access Licensing Board maintains over 40 public access sites on rivers throughout Massachusetts, none are located on Shawsheen. There is keen interest and potential financial support of this board in developing at least one site on the Shawsheen River.

SRWA must enhance the A.V.I.S./Bay Circuit Trail Organizations in their efforts at promoting hiking trail expansions. Bay Circuit has a circular trail along the Merrimack (south end of river) that goes through Tewksbury and connects with Andover and North Andover. Not all portions are connected as yet, particularly through the State Hospital property in Tewksbury. It is suggested that EOEA and SRWA look at the DEM Trails Grant Program for possible future funding to help connect this portion.

Fishing is also a recreation use enjoyed by hundreds of citizens annually throughout the watershed. DFWELE regularly stocks trout at several access points along the river in the spring

of each year. Anglers fish for these, as well as bass, pickerel, and pan fish. DFWELE did a fish assessment study in 1998, and the expected report will recommend a plan of action to embark upon to enhance citizen angling opportunities in the future.

Lastly, swimming is an activity that cannot be neglected. For years youth have utilized the river in the summer for refreshment. Though this use is presently not recommended due to bacterial water quality standards not being met, it is hoped that the WAPs water quality improvement goal will make this possibility formally realizable by 2010 or before in the mainstem.

Action Project #5 – Promote Education and Outreach About Resources of the Watershed

Much of the credit for publicity of activities and projects of the team must be given to the emerging river advocacy organization in the past five years: the Shawsheen River Watershed Association. The organization is the offshoot of the Shawsheen Watershed Environmental Action Team (S.W.E.A.T.), which has existed since about 1990. The S.W.E.A.T. had sponsored for 10 years, river cleanups during warmer seasons, river canoe trips, and races. The Shawsheen River Watershed Association began organizing in 1998, mainly over the publicity of flooding issues in the watershed, and the need for concerted public action. SRWA established its constitution in 2000, and elected its first president and board of directors. 2001 saw the organization being formally approved by the state as a 501 C(3) tax-exempt non-profit organization. The organization has increasingly grown, in both membership and effectiveness, as a river-keeper advocate for protection and improvement of the river for citizens' use and enjoyment. The organization plays the role of the river-keeper protection advocate in many of the land development related issues in various towns in the watershed. Most importantly, the organization has served as a springboard catalyst on presenting issues and programs on a watershed, rather than a single community basis. More people than ever before have learned that they live in and are a formal part of the Shawsheen watershed.

The future is bright for SRWA to emerge as an effective voice in better protecting and promoting the resources of the watershed. The SRWA has a bi-monthly newsletter that reaches over 500 homes in the watershed. EOEA and SRWA need to build the outreach newsletter so that it reaches thousands of homes. There is a need to install Shawsheen River signs at road-river crossings throughout the watershed. This will enhance citizen curiosity to learn and become more involved with issues of the watershed.

There is also a need to develop efforts to further enhance outreach and education about the value and benefits of the resources of the watershed, and how these resources can be used and enjoyed by the maximum number of citizens. These efforts will result in generalized awareness about the watershed and in increased participation in SRWA and its programs. It is hoped that local newspapers and local Cable TV channels will run regular special programs on the watershed. The Massachusetts Watershed Coalition has a special grants program to assist citizen watershed organizations to develop effective public media packages, to effectively "get the word out" to the public about the organization, and the good work it is doing to promote the watershed.

Additionally, the SRWA will foster outreach by conducting several education forums each year on special topics of public interest, (e.g., beaver problems, invasive species problems, and native species that inhabit – owls, turtles, birds, etc.). A project to study and address beaver problems in the watershed is currently being undertaken by DFWELE.

EOEA and SRWA hope to launch a future environmental education effort in the public schools. The idea is to develop and institute teacher-training programs to incorporate aspects about the resources of the watershed into established math, science, and social studies curriculums currently taught in the schools. Teachers could incorporate appropriate parts into their curriculums, train many more students, who in turn can affect parents at home, etc. Members of the community and the SRWA are encouraged to participate by going to the classroom and

sponsoring field trips and field exercises using the outdoors as an environmental learning laboratory.

The SRWA would also utilize the recently developed Recreation Guide/Map and web site in the public schools and be involved in wider distribution of the guide/map and web site to homes and businesses throughout the watershed.

APPENDIX 1- STEERING COMMITTEE MEMBERS

Towns

- Bedford
- Billerica
- Tewksbury
- Andover
- Burlington

State Agencies

- DEP
- DFWELE
- Riverways
- DEM
- EOE

Watershed Associations

- Shawsheen River Watershed Association
- Merrimack River Watershed Council



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Lt. Governor

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